



**National
Transportation
Safety Board**

Lithium Batteries on Airplanes:

Is this an accident waiting to happen?

Robert Sumwalt FRAeS



Our mission:
Prevent Accidents
Reduce Injuries
Save Lives





NTSB is an ACCIDENT INVESTIGATION AGENCY

(1) The National Transportation Safety Board shall investigate or have investigated (in detail the Board prescribes) and establish the facts, circumstances, and cause or probable cause of—

- (A) an aircraft accident ...
- (B) a highway accident, including a railroad grade crossing accident...
- (C) a railroad accident in which there is a fatality or substantial property damage, or that involves a passenger train;
- (D) a pipeline accident in which there is a fatality, substantial property damage, or significant injury to the environment;
- (E) a major marine casualty ...
- (F) any other accident related to the transportation of individuals or property when the Board decides
 - (i) the accident is catastrophic;
 - (ii) the accident involves problems of a recurring character; or
 - (iii) the investigation of the accident would carry out this chapter.



Consumer Electronics



Aircraft Power Systems

Shipment of Batteries

Consumer Electronics



Fire Caused By Vape Pen Battery Delays Houston-Bound Flight From LaGuardia

February 13, 2019 at 11:43 pm Filed Under: [Delta Airlines](#), [Jessica Layton](#), [LaGuardia Airport](#), [Local TV](#)



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NTSB

LITHIUM BATTERIES & LITHIUM BATTERY-POWERED DEVICES

Aviation Cargo and Passenger Baggage Events Involving Smoke, Fire, Extreme Heat or Explosion Involving Lithium Batteries or Unknown Battery Types

As of February 1, 2019, 241 air/airport incidents involving lithium batteries carried as cargo or baggage that have been recorded since March 20, 1991

all investigative or enforcement actions taken. This list does not include three major aircraft accidents where lithium battery cargo shipments were implicated but not proven to be the source of the fire: An Asiana Airlines 747 near South Korea on July 28, 2011, a UPS 747 in Dubai, UAE on September 3, 2010 and a UPS DC-8 in Philadelphia, PA on February 7, 2006

Date	Source	Type of Battery	Device (if applicable)	Carrier	Aircraft Type (Passenger or Cargo)	Incident Summary
1/28/2019	Airline	Li-Ion	Spare Battery	Delta	Passenger	While waiting to board flight 797 from Austin, TX (AUS) to Detroit, MI (DTW), a spare battery in a passenger's carry-on bag caught fire in the boarding bridge. A flight attendant with a bottle of water extinguished the fire. The terminals of the batteries were not protected.

As of 2/1/2019
FAA Office of Security and Hazardous Materials Safety

1

Federal Aviation Administration provided data

Aircraft Power Systems





APU Battery Fire

Japan Airlines

Boston

Jan 7, 2013

Main Battery Event

All Nippon Airways

Takamatsu, Japan

Jan 16, 2013

787 Grounded



FAA
Aviation Safety

EMERGENCY AIRWORTHINESS DIRECTIVE

www.faa.gov/aircraft/safety/alerts/

DATE: January 16, 2013
AD #: 2013-02-51

Emergency airworthiness directive (AD) 2013-02-51 is sent to owners and operators of The Boeing Company Model 787-8 airplanes.

Background

This emergency AD was prompted by recent incidents involving lithium ion battery failures that resulted in release of flammable electrolytes, heat damage, and smoke on two Model 787-8 airplanes. The cause of these failures is currently under investigation. These conditions, if not corrected, could result in damage to critical systems and structures, and the potential for fire in the electrical compartment.

FAA's Determination

We are issuing this AD because we evaluated all the relevant information and determined the unsafe condition described previously is likely to exist or develop in other products of the same type design.

AD Requirements

This AD requires modification of the battery system, or other actions, in accordance with a method approved by the Manager, Seattle Aircraft Certification Office (ACO), FAA.

Interim Action

We consider this AD interim action. As the investigation progresses, we might determine that additional action is necessary.

Authority for this Rulemaking

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. Subtitle I, Section 106, describes the authority of the FAA Administrator. Subtitle VII, Aviation Programs, describes in more detail the scope of the Agency's authority.

We are issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701, "General requirements." Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

Presentation of the Actual AD

We are issuing this AD under 49 U.S.C. Section 44701 according to the authority delegated to me by the Administrator.

2013-02-51 The Boeing Company: Directorate Identifier 2013-NM-016-AD

Effective Date

This Emergency AD is effective upon receipt.

Affected ADs

None.

Applicability

This AD applies to all The Boeing Company Model 787-8 airplanes, certificated in any category.

Subject

Joint Aircraft System Component (JASC)/Air Transport Association (ATA) of America Code
Electrical power

Unsafe Condition

This AD was prompted by recent incidents involving lithium ion battery failures that resulted in release of flammable electrolytes, heat damage, and smoke on two Model 787-8 airplanes. The cause of these failures is currently under investigation. We are issuing this AD to prevent damage to critical systems and structures, and the potential for fire in the electrical compartment.

Compliance

Comply with this AD within the compliance times specified, unless already done.

Modification or Other Action

Before further flight, modify the battery system, or take other actions, in accordance with a method approved by the Manager, Seattle Aircraft Certification Office (ACO), FAA.

Alternative Methods of Compliance (AMOCs)

(1) The Manager, Seattle ACO, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or local Flight Standards District Office, as appropriate. If sending information directly to the manager of the ACO, send it to the attention of the person identified in the "Contact Information" section of this AD. Information may be emailed to: 9-ANM-Seattle-ACO-DC-Requests@faa.gov.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local flight standards district office/certificate holding district office.



NTSB

Auxiliary Power Unit Battery Fire
Japan Airlines Boeing 787-8, JA829J
Boston, Massachusetts
January 7, 2013



Incident Report
NTSB/AIR-14/01
PB2014-108867

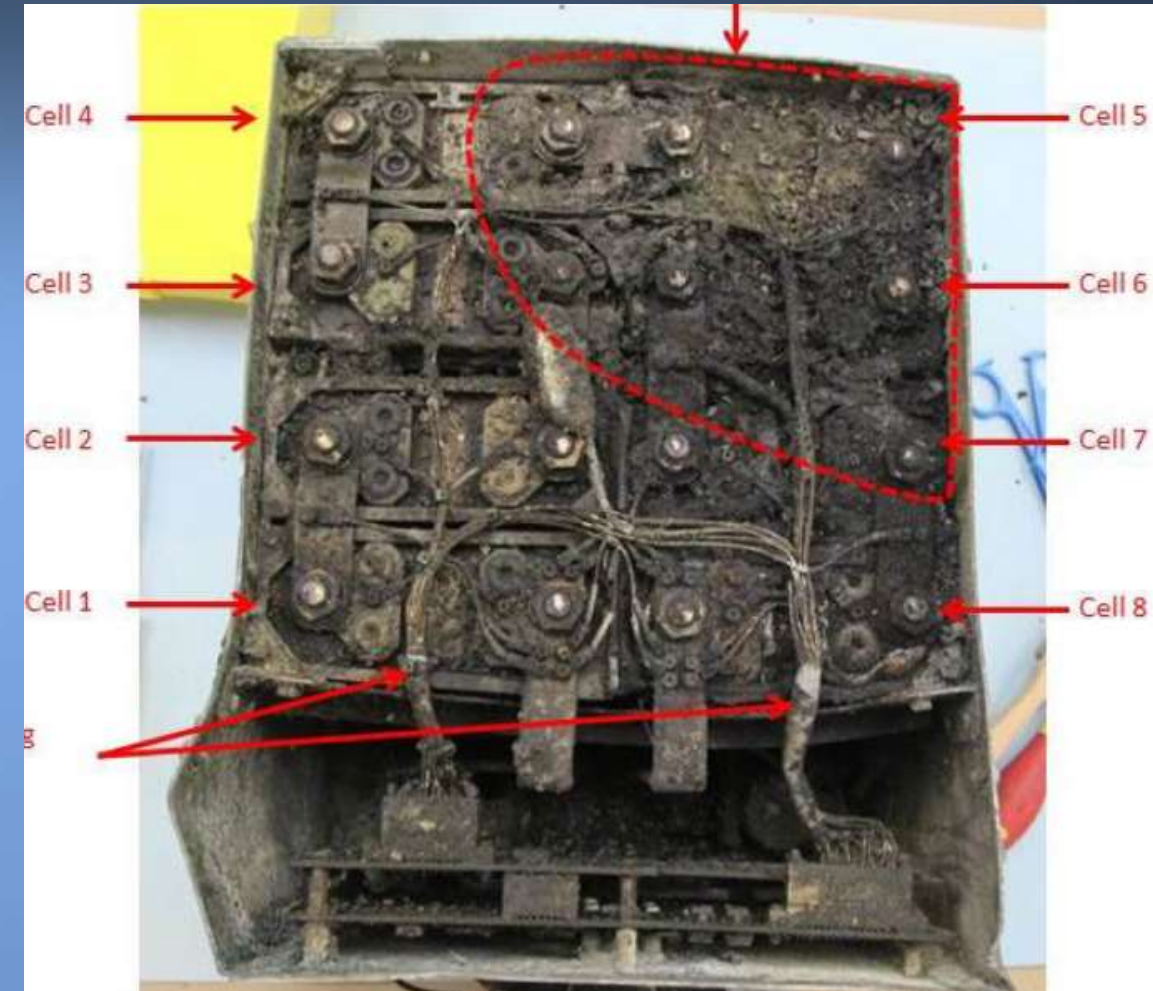
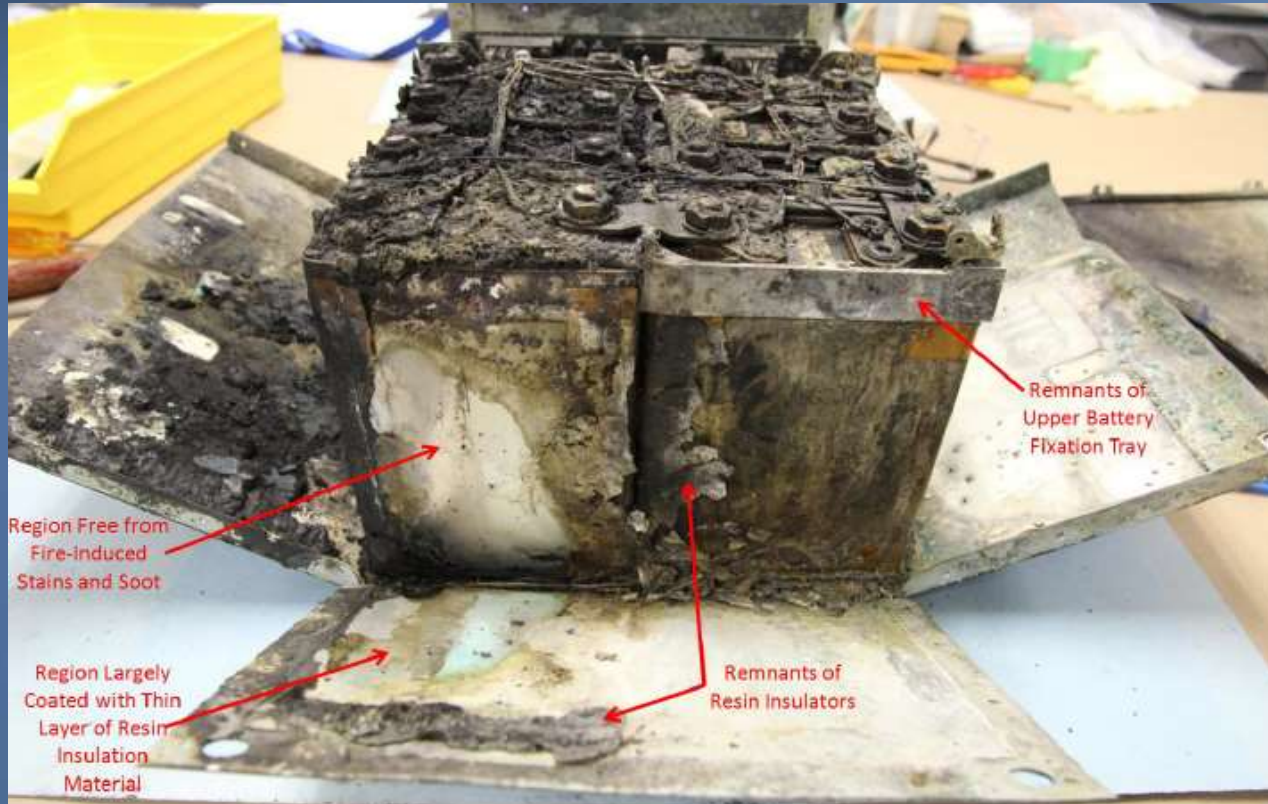


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JAL APU Battery




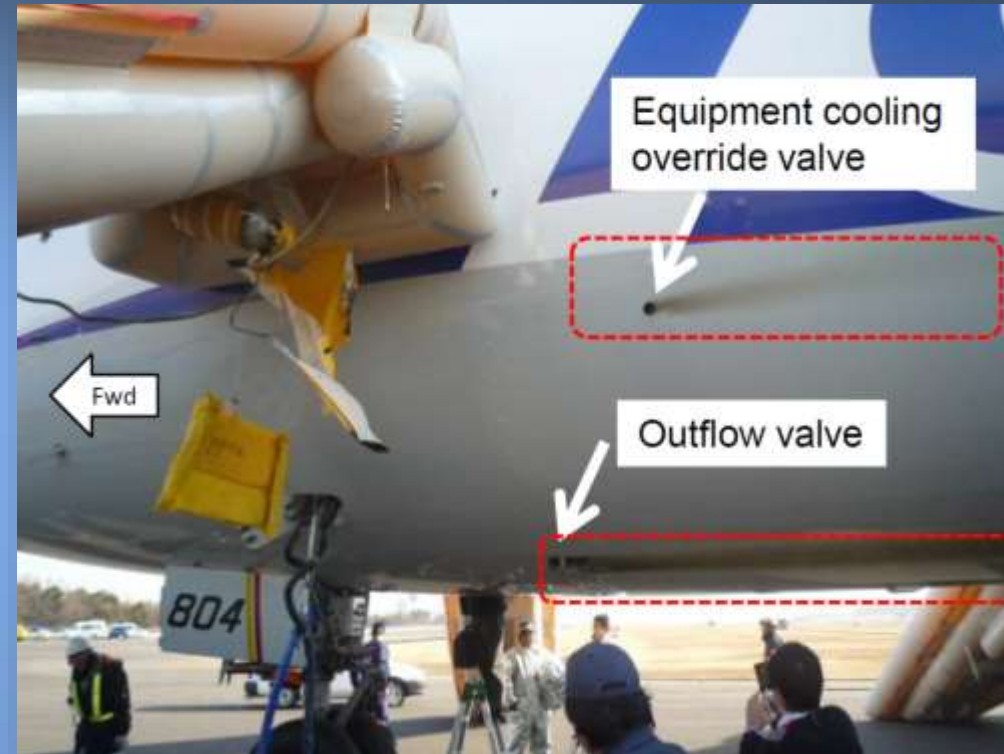
AI2014-4

AIRCRAFT SERIOUS INCIDENT INVESTIGATION REPORT

ALL NIPPON AIRWAYS CO., LTD.
J A 8 0 4 A

September 25, 2014

 **NTSB** Japan Transport Safety Board




AI2014-4

AIRCRAFT SERIOUS INCIDENT INVESTIGATION REPORT

ALL NIPPON AIRWAYS CO., LTD.
J A 8 0 4 A

September 25, 2014

 JTSB Japan Transport Safety Board



Smoke Output of 787 Battery

Video shows amount of smoke output from eight cells of battery at UL Fire Laboratory (edited)

This smoke is hazardous to breath, potentially flammable, and corrosive.



Original location and size of compartment

NTSB Recommendations – JAL APU Battery Fire

- Recommendations to the FAA to ensure lithium-ion battery design and testing protect against excessive heating and thermal runaway. Also FAA should improve its certification process for new technologies.
- Recommendations to Boeing to better oversee the manufacturing standards in its supply chain, and to strengthen the safety assessments of its designs.

Shipment of Batteries



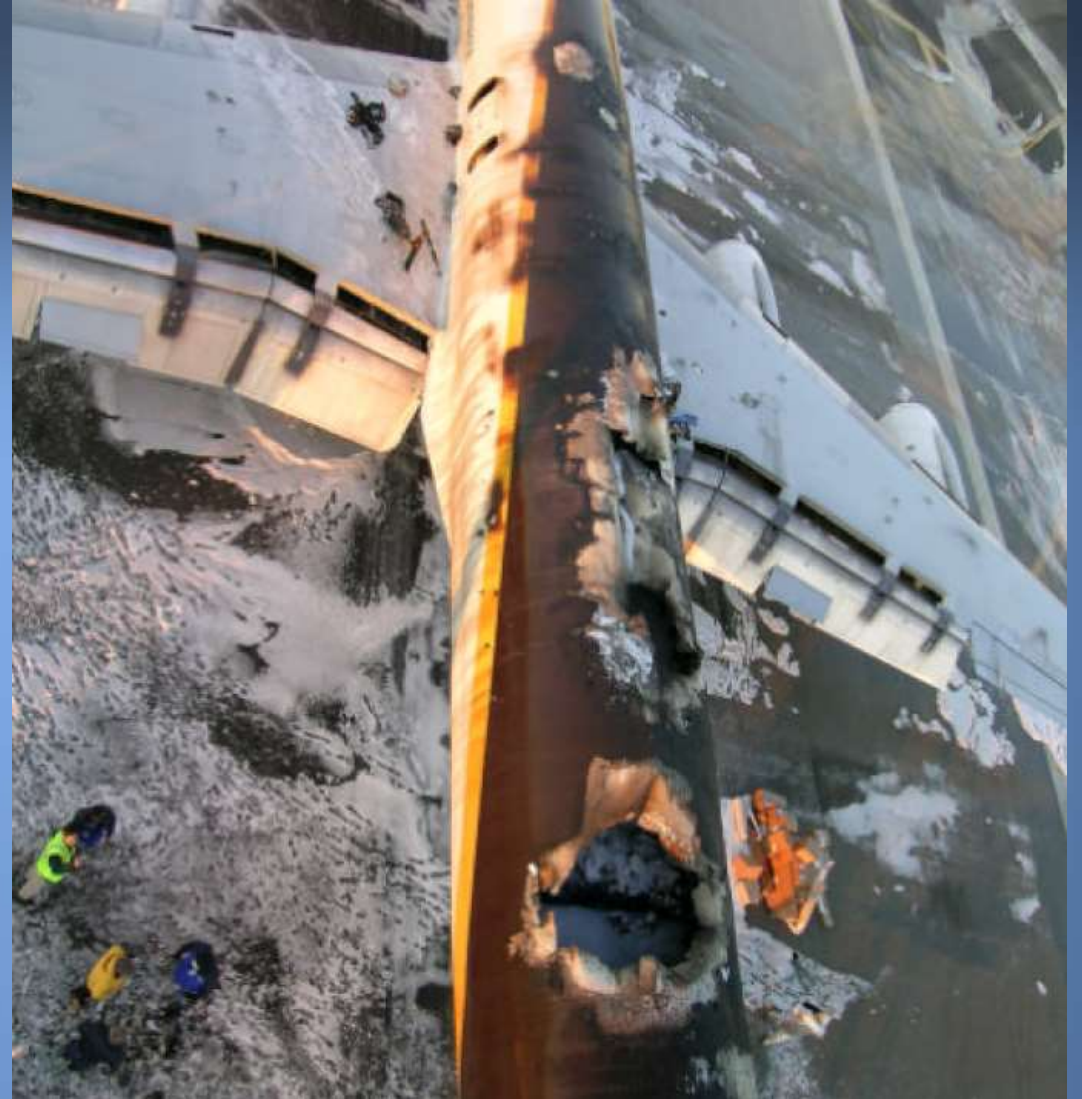
Inflight Cargo Fire
United Parcel Service Company Flight 1307
McDonnell Douglas DC-8-71F, N748UP,
Philadelphia, Pennsylvania
February 7, 2006



ACCIDENT REPORT
NTSB/AAR-07/07
PB2007-910406



National
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NTSB





AAIS Case Reference: 13/2010

AIR ACCIDENT INVESTIGATION SECTOR

FINAL

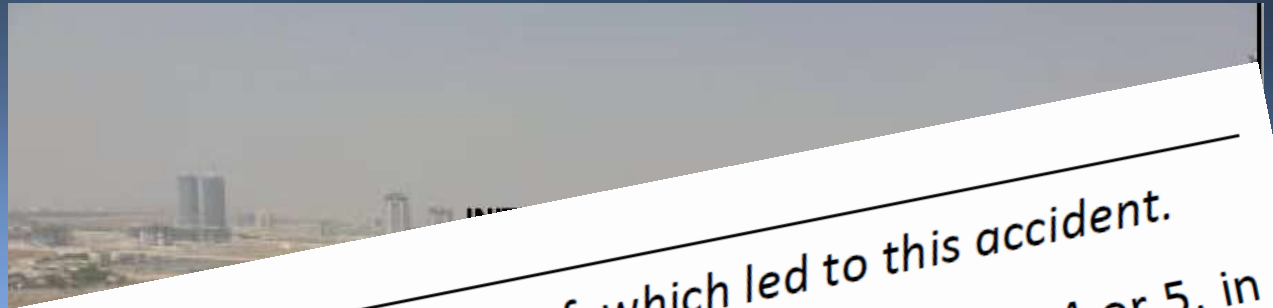
AIR ACCIDENT INVESTIGATION REPORT

Uncontained Cargo Fire Leading to Loss of Control
Crash and Uncontrolled Descent Into Terrain

3.2

CAUSES

- Causes** are actions, omissions, events, conditions, or a combination thereof, which led to this accident.
- 3.2.1 A large fire developed in palletized cargo on the main deck at or near pallet positions 4 or 5, in Fire Zone 3, consisting of consignments of mixed cargo including a significant number of lithium type batteries and other combustible materials. The fire escalated rapidly into a catastrophic uncontained fire.



NTSB



ARAB/AAR1105

Aircraft Accident Report

Crash Into The Sea After An In-Flight Fire
Asiana Airlines
Boeing 747-400F, HL7604
International Waters 130 km West Of Jeju Int'l Airport
28 July 2011



24 July 2015



Aircraft and Railway Accident Investigation Board



NTSB



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